USDA NRCS Natural Resources Conservation Service
Wildlife Habitat Management Institute

Wildlife Habitat Management Note

Modeling pheasant responses to conservation buffers in Iowa

Ring-necked pheasant

Introduction

We consider the ring-necked pheasant a good indicator species of changes in farmed landscapes in the midwestern United States. Intensified agriculture is often cited as a major factor involved in observed declines in populations of pheasants and other bird species throughout the Midwest. Although wildlife agencies have developed various approaches to more effectively manage the habitat, there is good evidence that the remaining habitat fragments are not adequate to support large local pheasant populations. With the establishment of the Conservation Reserve Program (CRP) in the mid-1980s, biologists were hopeful that the large blocks of perennial grassland cover would substantially improve pheasant populations. In 1989, we began a study to understand the role of landscape changes, particularly the establishment of CRP, on pheasant population dynamics in northern Iowa. We integrated all aspects of the pheasants' life cycle into a population model that simulates movement, habitat selection, nesting, and survival of individual hens and their chicks throughout the annual cycle. With this modeling tool we can compare how pheasant populations respond to large-scale changes in the landscape that might result from different agricultural policies. For example, in this note we compare pheasant populations in landscapes with traditional CRP in large fields to conservation buffers initiated under continuous signup CRP.

Pheasant Life History: Results from Field Studies

Winter

■ ***Winter survival was strongly influenced by snow cover.***

Hens ranged over areas of approximately 200 acres during the winter. Winters with extensive snow cover and cold temperatures periodically reduced survival even in areas where wildlife managers considered cover adequate. During six winters of study, survival of radio-marked hens from 1 November to 1 April ranged from 23 to 96%. Predation, particularly by red fox, was the major cause of mortality.

Snow-filled cattail marsh

Spring Dispersal and Nesting

■ ***Survival of prenesting hens was reduced in areas with high amount of edge.***

Survival during the prenesting period in spring (1 April to 3 June) averaged 81%. Home ranges of radio-marked hens during the short settling period in spring averaged about 100 acres, about half the size of the areas used in winter. In early spring, the activity of hens is focused around the breeding territories of the roosters. Some hens dispersed over 2.5 miles from wintering areas to nesting locations.

Pheasant nest

■ ***Selection of nest sites and nest success were influenced by the landscape setting.***

Although hens were initially attracted to the breeding territories of roosters, they did not nest within that small area. Although hens commonly nested in roadsides, grassed waterways, and along the margins of wetlands, the centers of large blocks of cover were especially attractive nesting sites. Cover at the nest was residual cover from the previous year or rapidly growing cool-season vegetation. Nest success was greater among hens nesting in undisturbed cover, in blocks larger than 40 acres, and in landscapes where several similar blocks were located nearby. Nest success averaged 62% in undisturbed blocks of habitat such as CRP and 45% in small, linear, or disturbed habitats. Nests were primarily destroyed by mammalian predators, but avian predators, farm operations, weather, and abandonment also contributed to nest losses. The average date of hatching of first nests was June 15 and over 90% of hens had hatched a brood by July 15. Chick survival for the first month averaged 46%. Hens and chicks remained within about 300 feet of the nest only for the first day or two but then moved as much as 0.5 mile. After chicks hatch, hens and chicks use fields with a mixture of grasses and broad-leaved plants with an abundance of insects.

Pheasant Model

A computer model was developed to show locations of each hen and brood on a geographic information system map. The model simulates the survival and reproduction of each hen in the population on landscapes the size of a township. We used maps made from aerial photographs of parts of Iowa, and we created artificial maps that reflect different agricultural policies. For example, we projected changes in pheasant populations in areas where all CRP was removed from a township or when 25% of landowners participated in the buffer initiative.

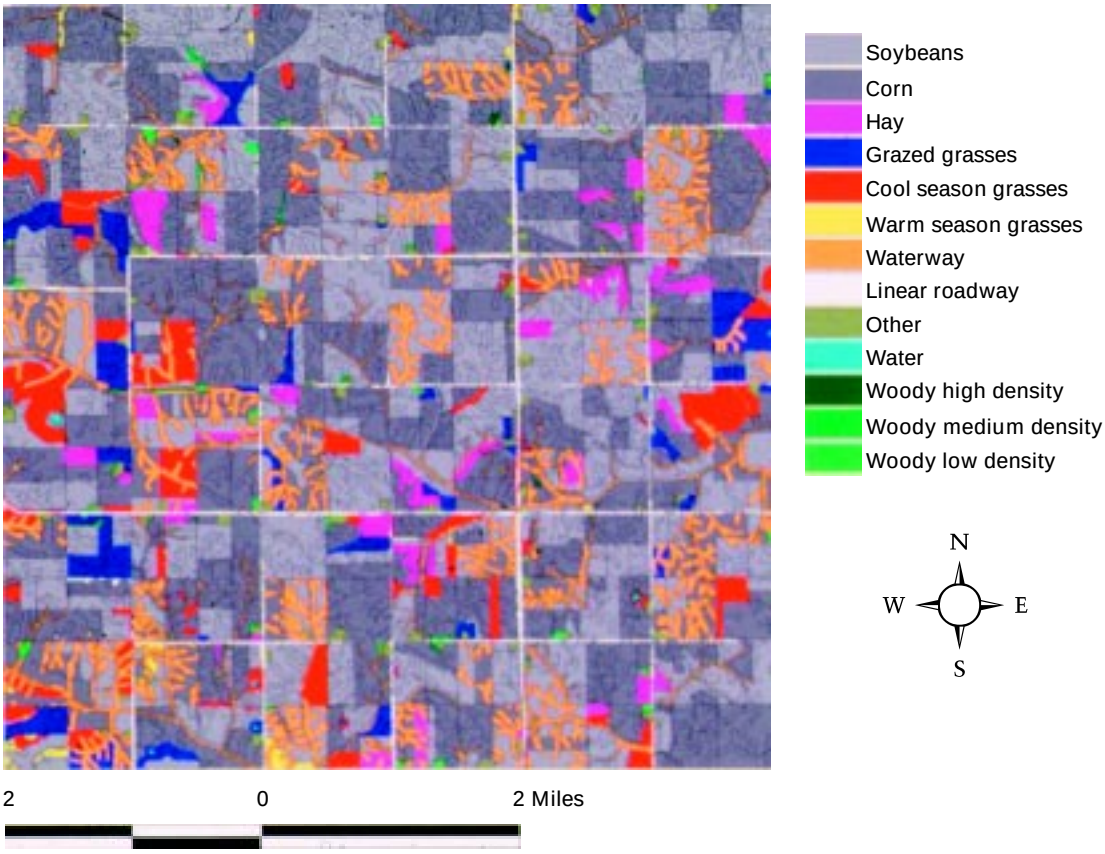
■ ***Simulated pheasant numbers were influenced by the proportion of the grassland in the landscape.***

We studied areas where the proportion of the landscape covered with perennial grassland in Iowa ranges from as low as only 2% where the habitat is only along roadside ditches to over 25% where there are many fields enrolled in CRP. Survival and reproduction of pheasants were reduced when winters were snowy and cold, and springs were wet and cool. After snowy winters, it took simulated pheasant populations at least 3 years to recover to previous levels in landscapes with <10% grassland. Simulated populations averaged less than 1 hen/mile^2 in these areas. In landscapes with about 25% grassland the population recovered within 1 to 2 years, and simulated populations averaged about 10 hens/mile^2. The relationship between the amount of core grassland and the amount of edge strongly influenced pheasant population responses. The simulated pheasant populations were only about one third as abundant when the grassland was in small blocks and along roadsides (about 30 feet of edge/acre of landscape) compared to when habitat was in larger blocks with less linear edge along crop fields (about 90 feet of edge/acre of landscape). Increasing the amount of grassland from 2% to 12% of the landscape had no effect on populations if the additional grassland was in small patches with lots of edge.

Nest location in CRP field

■ ***Simulated pheasant populations declined when block habitats, such as those created under traditional CRP, were converted to filter strip buffers.***

Because of these edge relationships, simulated pheasant populations were marginally increased when filter strip buffers were added to a landscape with no CRP but substantially increased when CRP was in large blocks. In townships where we simulated 25% participation by landowners in filter strip buffers, simulated pheasant populations were only about 5% greater than when there was no CRP at all. When equivalent grassland was enrolled in large fields of CRP pheasant populations were 53% greater compared to no CRP. Pheasant populations also were lower when the maximum filter strip width was reduced from 100 feet to 50 feet on both sides of the waterway.



Township in Poweshiek County with simulated 25% participation in conservation buffers.

Management Implications

1. Although pheasants are often called an edge species, field research and a simulation model from Iowa showed that their populations actually were more abundant in landscapes with moderate amounts of edge. Perennial grasslands in blocks of 40 to 160 acres were preferred by nesting hens. Populations were most productive and survived the best where blocks of CRP were near other large blocks of cover. Large blocks of grassland with a central core area reduced predation on nests. Adequate habitat for pheasants facilitated recovery from snowy, cold winters and cold, wet springs.

2. Mowing and grazing during the nesting season adversely affects pheasant productivity, so undisturbed CRP is especially valuable. Although hens are often attracted to hay fields, hens and nests are lost when these fields are cut in May and June. Mixtures of cool-season grasses and forbs, along with warm-season species provide very good nesting and brood cover. CRP stands need to be periodically renovated to maintain a diverse mixture of grasses and forbs. Mixtures of native prairie grasses and broad-leaved forbs provide excellent long-lasting, low maintenance habitat.

3. When designing conservation buffers for pheasants, maximum width (usually 100 feet for grassland buffers) is recommended. Extend the total project area as large as possible so that the negative effects of edge are reduced. Placement of buffers adjacent to other blocks of habitat (CRP, shrubby woodlots, wetlands) in the neighboring landscape will enhance the value of a project for pheasants.

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